

# **Bull Trout Redd Monitoring in the Wallowa Mountains (2006 and Beyond)**

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## **ABSTRACT**

Bull trout were listed as threatened under the Endangered Species Act in 1998 due to declining populations. The U. S. Fish and Wildlife Service (Service) recommends monitoring populations in subbasins where little is known including the Grande Ronde and Imnaha subbasins. Spawning survey data is important for determining relative abundance and distribution trends in bull trout populations. The Bull Trout Redd Monitoring in the Wallowa Mountains report summarizes the 2006 bull trout spawning data collected in the Wallowa Mountains of NE Oregon and compares this with past years' data. Bull trout spawning surveys have been conducted on similar index areas for selected Grande Ronde and Imnaha River streams from 1999 to 2006. Surveys were conducted by the Oregon Department of Fish and Wildlife (ODFW), U.S. Forest Service (the Forest), Service, Nez Perce Tribe (NPT), National Marine Fisheries Service (NMFS), Anderson Perry, fisheries consultants, and volunteers. Objectives of the survey included; locate bull trout spawning areas, determine redd characteristics, determine bull trout timing of spawning, collect spawning density data, determine and compare the spatial distribution of redds along the Lostine River in 2005 and 2006, and over time use this data to assess local bull trout population trends and the long-term recovery of bull trout. Timing of spawning, total redds, redd sizes, and redd locations are documented in the report. The local bull trout populations were relatively stable for the survey period. The Imnaha population is one of the strongholds within the Imnaha Subbasin. The Lostine River and Bear Creek contain brook trout and hybridization may be occurring.

## **ACKNOWLEDGMENTS**

The Service has, for the past three years, provided staff time necessary for the coordination, implementation, and analysis and report summarization of this project. Prior to Service support of this project, the Wallowa-Whitman National Forest, Wallowa Mountains Office (WMO) had secured previous years' funding and support, and was responsible for the coordination, implementation, and analysis and report summarization.

This project would not have been possible without the dedication, hard work, funding, and assistance provided by all the partners. The WMO provided an invaluable service in 2005 and 2006, providing a horse/mule packer to pack us in and out of the Upper Imnaha to conduct our annual spawning survey in that drainage. We had contracted this service in past years.

I would like to thank the partners in 1999 - 2006 which included; the WMO, ODFW, NPT, the Service, NOAA, and Anderson Perry and Associates (Anderson Perry), consultants, and volunteers. Special thanks to the people who walked the streams, helped with scheduling surveys and surveyors, provided access to private property, assisted in mapping, or summarized the data. These included: Gary Miller, Brad Smith, Alan Miller, Ken Bronec, Peter Cleary, Marisa Meyer, Everett Leach, Jeff Nehls, Maria Shepherd, Cindy Sloan, Rick Christian, Jeff Yanke, Ian Wilson, Jake Kimbro, Jamie McClure, Dave Bright, Suzanne Nostrant, Shivonne Nesbit, John Stephenson, Keith Paul, Max Hoffman, Andrew McClay, Mary Hawkins, Don Hair, Dana McCosky, Dave Kwasniewski, Ari Martinez, Rachel Rounds, Tiffany Tumelson, Greg Silver, Jennifer Lord, Jody Delavan, Lynne Price, Mac Huff, Tim Whitesel, Paul Sankovich, Dana Orrick, Jim Harbeck, Sue Womack, Jennifer Poirier, Tim Plawman, Darren Gallion, Paul Wilson, Al Hemmingsen, Levi Pinkham, Pete McHugh, Shane Vatland, Megan Lucas, Troy Baker, John Brunzell, Phil Howell, Ed Bowles, Susanna Allen, Brad Lovatt, Erin Hanson, Mark Robertson, Debbie Barkow, Dale Hanson, Krischele Hampton, Pat Kinery, Susan Lindstedt, Erin Barry, Dwayne Shotton, Jason Haubelt, Rochelle Rusczyk, Vince Tranquilly, Jon Rombach, Patrick Vichit, and Patrick Bishop.

## **INTRODUCTION**

Bull trout were listed as threatened under the Endangered Species Act in 1998 due to declining populations. The Service recommends monitoring populations in subbasins where little is known including the Grande Ronde and Imnaha subbasins (USFWS 2002). Spawning survey data is important for determining relative abundance and distribution trends in bull trout populations. A minimum of 15 years is needed for determining bull trout population trends (Maxwell 1999). Bull Trout redd counts (spawning surveys) have been conducted annually on the Wallowa Valley, Hells Canyon National Recreation Areas (HCNRA), and Eagle Cap districts of the Forest and along some sections of private property of the Lostine River by the Service, ODFW, the Forest, NPT, contractors, and volunteers for the past seven to eight years.

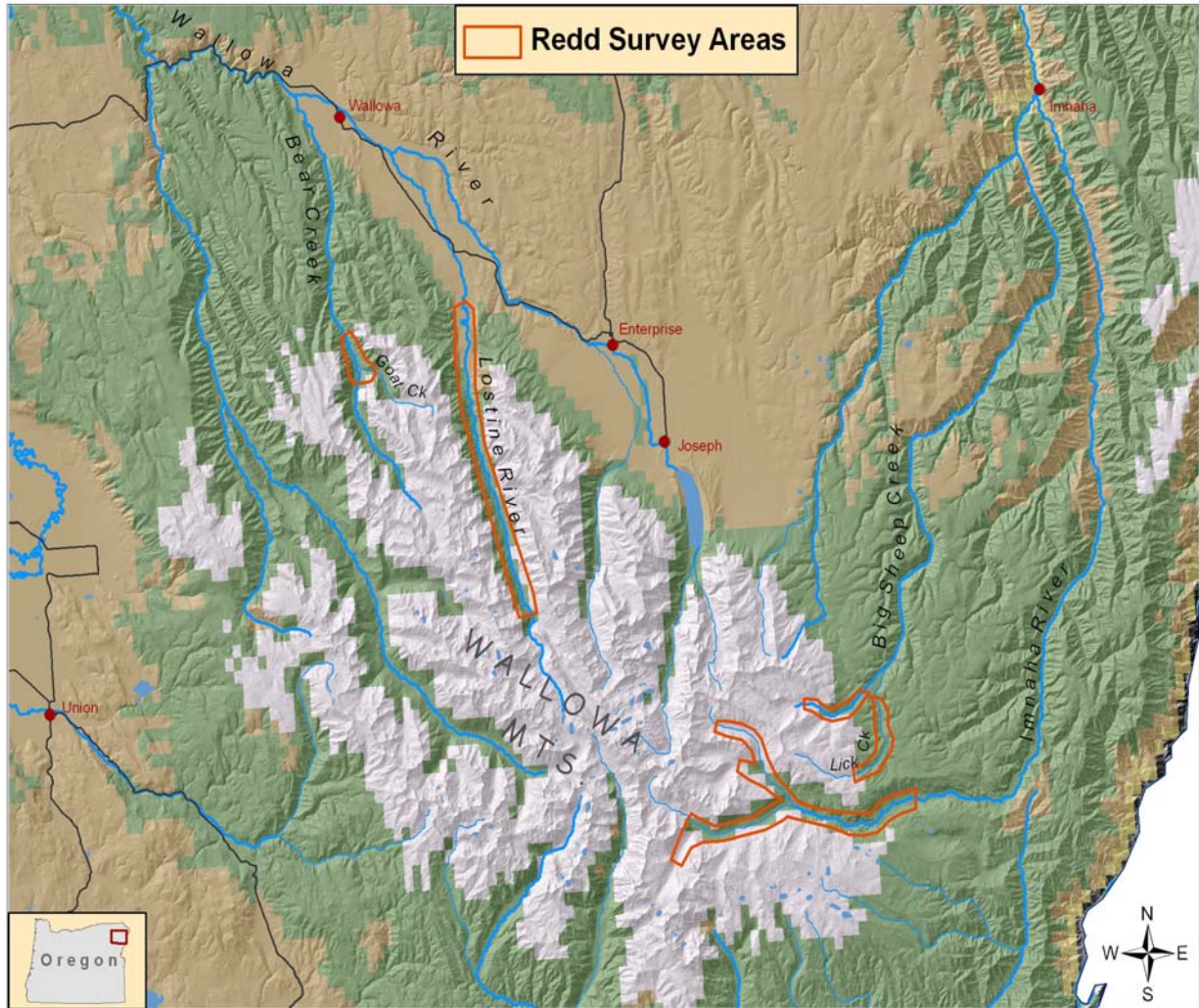
Objectives of the bull trout spawning surveys included:

- Locate bull trout spawning areas.
- Determine redd characteristics.
- Determine bull trout timing of spawning.
- Collect spawning density data.
- Map the location of the bull trout spawning reaches.
- Determine and compare the spatial distribution of redds along the Lostine River in 2005 and 2006.
- Access population trends for local bull trout populations.
- Use this information for the long-term recovery of bull trout.

## LOCATION

The Service and several partners conducted bull trout spawning surveys in 2006 on selected streams in the Grande Ronde and Imnaha Sub-Basins. Stream systems surveyed in 2006 for bull trout redds included; the Lostine River, Bear and Goat Creeks, the Imnaha River, Big Sheep Creek and Lick Creek (Figure 1).

Figure 1. Wallowa Mountain Bull Trout Redd Survey Areas.



## METHODS

Spawning surveys for bull trout require as many as ten to twelve people in one day (for complete surveys on large rivers) to complete the surveys during the spawning time. As mentioned above, this project would not be possible without the cooperative effort of partners. Surveyors walk the rivers through the selected “index areas” to locate the bull trout redds.

This project is part of a larger effort in NE Oregon and SE Washington that is occurring at the same time (September – October). Due to the lack of available experienced surveyors to conduct these river surveys, over the years, we have had to increase our survey days on the accessible sections of the Lostine and Imnaha Rivers to 2 days (conducting half of the survey length one day and the other half the following day), rather than one day. Surveys were conducted twice (mid and late bull trout spawning season) on the Lostine River, Big Sheep Creek, Lick Creek, and Middle Imnaha (Blue Hole to Indian Crossing). One-time surveys were conducted late in the spawning season in 2006, on the Upper Imnaha River and tributaries, and Bear and Goat Creeks, due to access and funding limitations. Refer to Appendix B, Table 1 comparing survey data and survey frequency for 1999-2006 bull trout spawning surveys on selected Grande Ronde and Imnaha River streams. Total redd numbers are all redds documented, and not necessarily comparable river miles (refer to Appendix B, Table 2a-2d for comparable reaches and redd counts for those sections).

The survey protocol (in addition to repeat surveys, or one-time late surveys where feasible) included; 1) visit to known bull trout redd and review of survey form prior to redd count survey, 2) experienced bull trout redd count surveyor(s) paired with inexperienced surveyor (on the job training), 3) bull trout redds measured, data recorded, and redds flagged during survey, and 4) all stream flagging removed post surveys.

Data recorded during the bull trout spawning surveys included; 1) date of survey, 2) stream location, 3) size of redds, 4) visibility of redds, 5) number of redds, and 6) approximate number and sizes of bull trout observed during surveys. In past years, reach locations (upstream and downstream boundary UTM coordinates) were documented. In 2006 (similar to 2005), in addition to the above, bull trout redd UTM locations on the Lostine River within the “index areas” also were documented.

Information collected during our bull trout spawning surveys is compiled by the Service and made available to other agencies (i.e., this report).

## RESULTS

### Location of Bull Trout Spawning Habitat Areas Surveyed

Bull trout spawning surveys have been conducted on similar index areas for selected Grande Ronde and Imnaha River streams from 1999 to 2006. From 1999 to 2006 bull trout spawning areas have been established (in particular, the Lostine and Imnaha Rivers) for these streams. Redd characteristics have been measured on these streams. The Middle Imnaha (Imnaha River from the fish weir below Gumboot confluence to Indian Crossing) was not surveyed in 2005 and 2006, (this area was surveyed in 1999 to 2004 and is considered bull trout spawning habitat). This portion of known bull trout spawning habitat on the Imnaha was not surveyed for the past several years, because of limited funding, a lack of experienced surveyors and a minimal number of redds documented in this area in past years.



1999-2006 Cooperative multi-agency effort surveying and measuring bull trout redds on the Lostine River. (Photo courtesy of U.S.F.S.)

## Timing of Bull Trout Spawning

Bull trout timing of spawning for our surveyed streams in general is approximately September 1 through October 15, and as early as August 15 in the Imnaha River system. The Lostine River has been very consistent or predictable (with commencement of spawning documented in 2006 as early as the first week in September), and Imnaha (being a much larger system) has been less predictable. (The above information is based on documentation during bull trout spawning surveys and chinook surveys where bull trout were spawning).

We are not exactly certain of when spawning commences and ends within the Upper Imnaha (within the mainstem, North Fork, South Fork, and Cliff Creek [a resident tributary]). We have questions as to what time of the year, dependent on annual flows, bull trout pass over the falls. Some years we have seen fluvial size bull trout spawning in the South Fork Imnaha in mid-late Sept/early October and in recent years we have not. ODFW observed large fluvial bull trout spawning in South Fork Imnaha in mid August 2005 (B.Knox, ODFW, pers. comm, 2005). ODFW has observed fluvial bull trout spawning as early as mid August (during chinook surveys) below the Imnaha falls and as late as early October (during our bull trout surveys) in several years (B. Smith, ODFW, pers. comm., 2005). We need more years of observation and survey collection to understand bull trout spawning and adult movement in the Imnaha Sub-Basin, and Big Sheep and Bear Creek Watersheds.



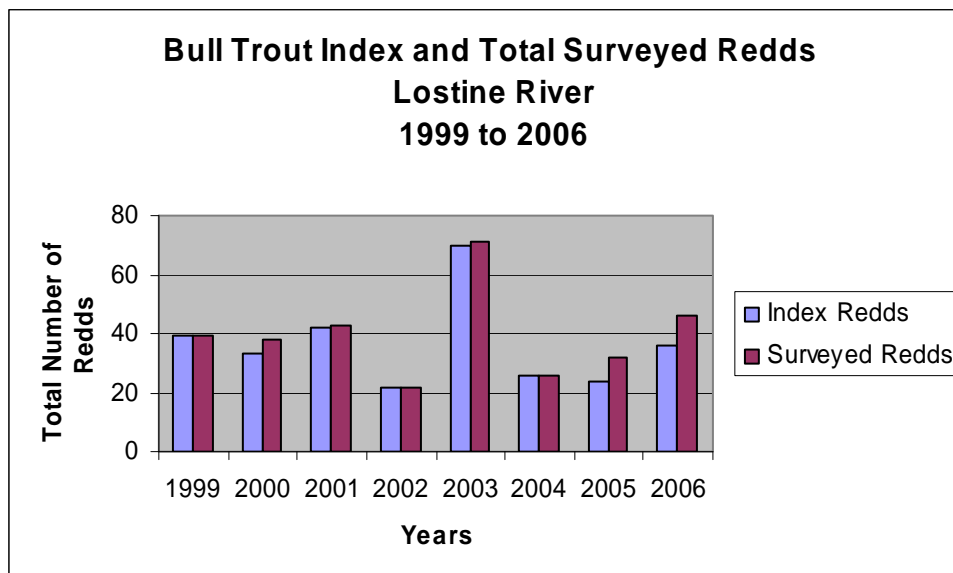
Bull Trout Spawning Trio on Redd, Lostine River  
(Photo courtesy of U.S.F.S.).

## Total Number of Bull Trout Redds

### *Lostine River*

Refer to Appendix B, Table 3a and 3b for bull trout redd count summary data for 2006. Forty-five total bull trout redds for 10.5 miles of survey (including Pole Bridge to Six Mile Bridge) were documented in 2006 on the Lostine River. Pole Bridge to Six Mile Bridge section has not been surveyed every year. The following data for the Lostine River compares consistently surveyed index areas on the Lostine River (8.5 miles) from 1999 to 2006 excluding the Pole Bridge to Six Mile section (Figure 2). The Lostine River had a low of 22 redds in 2002 to a high of 70 redds in 2003. There has been an increasing trend in redd numbers since 2004, although numbers have not reached the 2003 totals. The eight year average from 1999 to 2006 for the Lostine River is 37 redds. Redds in 2003 for the Lostine River totaled 70, which is almost double the 8-year average. Total redd numbers (in the 8.5 miles of comparable index areas) on the Lostine ranged from 22-70 redds within the 8- year period (not consecutively). The highest bull trout redd numbers (“the bread and butter”) within the Lostine River has consistently been observed and recorded in the headwaters, from Shady Campground to Bowman [approximately River Mile (RM) 24.5 to RM 22].

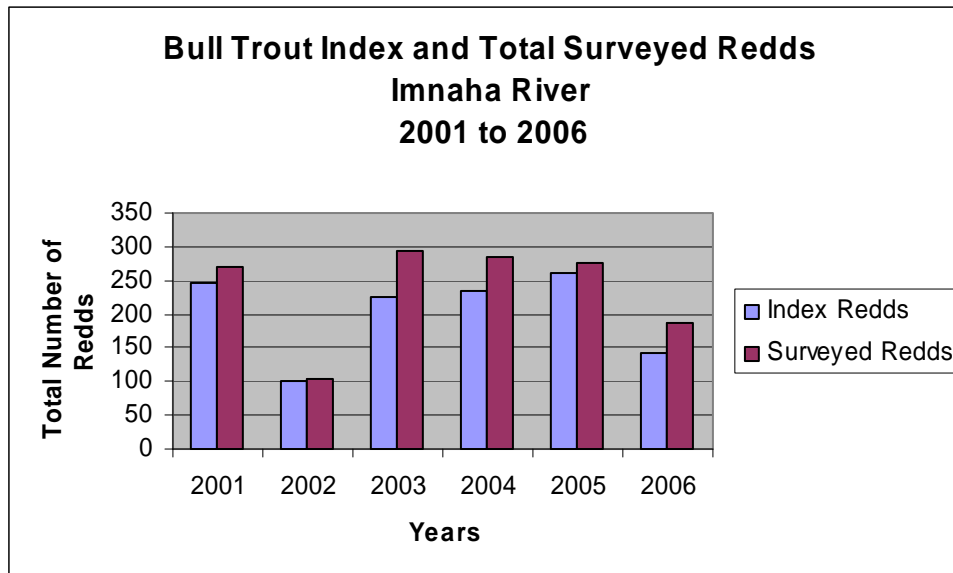
**Figure 2. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 1999 to 2006 on the Lostine River.**



## *Imnaha River*

One hundred and eighty six total bull trout redds for 19.4 miles of survey were documented in 2006 on the Imnaha River (from Indian Crossing to Blue Hole and upstream). Indian Crossing to Blue Hole was surveyed twice (mid to late spawning season) and upstream areas were surveyed once (mid spawning season) in 2006. The following data for the Imnaha River compares consistently surveyed index areas on the Imnaha River (17.5 miles) from 2001 to 2006 (Figure 3). Redd counts on the Imnaha River system had increased from 101 redds in 2002 to 261 redds in 2005, and decreased to 141 redds in 2006. The six-year average from 2001 to 2006 was 201 redds for the Imnaha River system. Total redd numbers on the Imnaha ranged from 101-261 within the 6-year period. The highest bull trout redd counts for the Imnaha River from 2001 to 2006 was recorded in the Upper Imnaha from Blue Hole to Cliff Creek, including Upper Imnaha tributaries. In 2006, there was a significant shift in documented spawning distribution from past years. In 2006, the majority of the spawning bull trout were located from the Imnaha falls to Indian Crossing, whereas, in past years the distribution had higher numbers above the Blue Hole (two miles upstream of Indian Crossing), as well as in the upper tributary streams (S.F. and N.F. Imnaha).

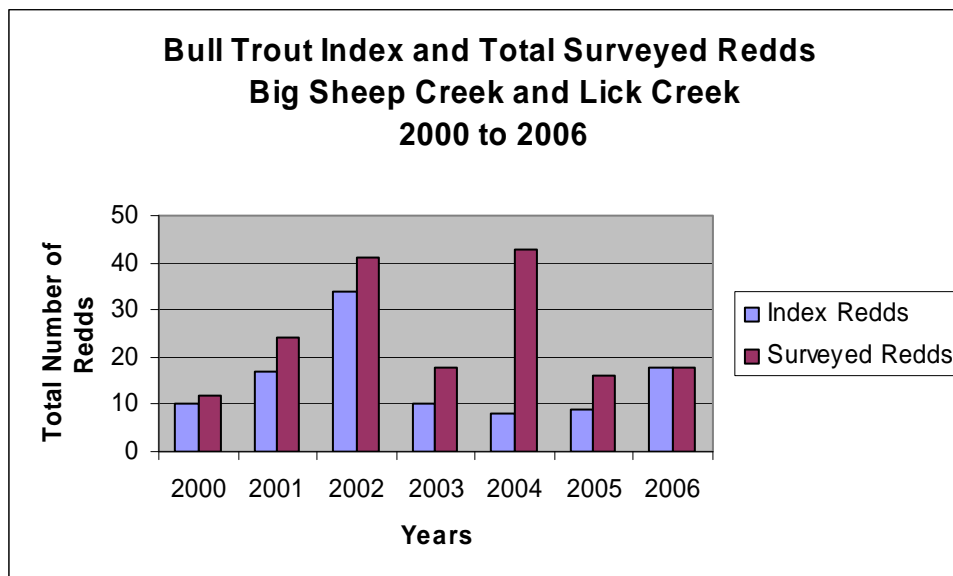
**Figure 3. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 2001 to 2006 on the Imnaha River.**



## *Big Sheep Creek*

Eighteen total bull trout redds for 8.6 miles of survey were documented in 2006 on Big Sheep Creek and Lick Creek. These areas were surveyed twice in 2006, mid to late spawning season. The following data for Big Sheep Creek compares consistently surveyed index areas on Big Sheep and Lick Creek (7.6 miles) from 2000 to 2006 (Figure 4). Redd counts on the Big Sheep system had decreased from 34 redds in 2002 to 18 total redds in 2006. The seven-year average from 2000 to 2006 was 15 for the Big Sheep system. Total redd numbers within the Big Sheep system ranged from 8-34 within the 7-year period. Redd surveys for bull trout in the Big Sheep system have been limited in miles of survey (8.4 to 14.1 miles from 2000 to 2006) and in frequency, (2000-2001 surveys were conducted once late season, and in 2002, 2003, 2005, and 2006 surveys were conducted twice, mid and late season). In 2004, the survey was conducted once late season for Big Sheep and twice, mid and late season for Lick Creek.

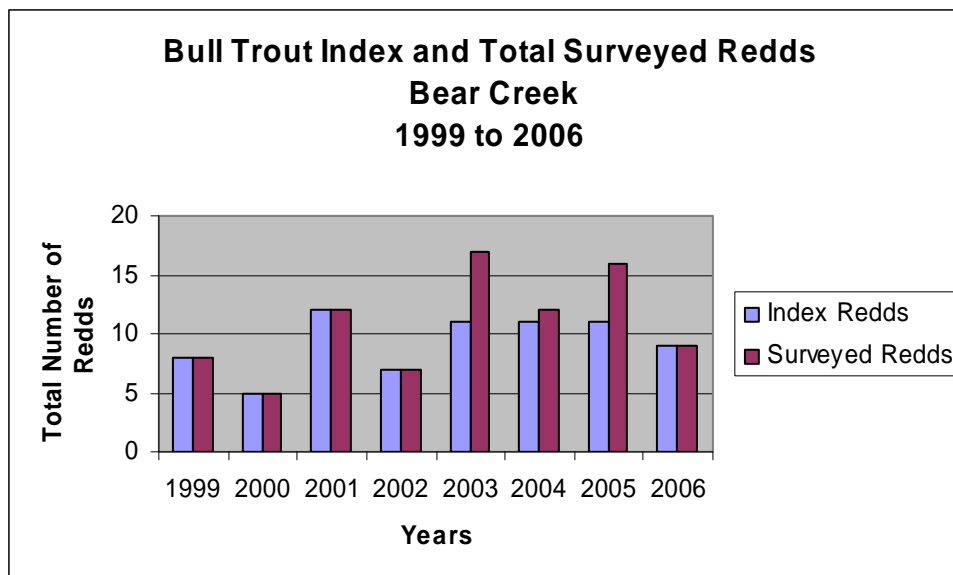
**Figure 4. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 2000 to 2006 on Big Sheep and Lick Creeks.**



## Bear Creek

Nine total bull trout redds for 2.8 miles of survey were documented in 2006 on Bear Creek (including Goat Creek). These areas were surveyed once in 2006, late spawning season. The following data for Bear Creek compares consistently surveyed index areas on Bear Creek and Goat Creek (1.9 miles) from 1999 to 2006 (Figure 5). Redd counts on Bear Creek and Goat Creek had a low of 5 redds in 2000 to a high of 12 total redds in 2001, and decreasing to 9 redds in 2006. The eight-year average from 1999 to 2006 is 9 redds for Bear and Goat Creeks. Bear Creek/Goat Creek spawning data collected from 1999 to 2006 is restricted in scope due to access and funding limitations. The highest bull trout redd counts for the survey sections on Bear/Goat Creeks have been recorded in Goat Creek (mouth to waterfall, RM 0 to RM 0.9).

**Figure 5. Comparison of bull trout surveyed redds and index redds (comparable miles) documented from 1999 to 2006 on Bear Creek (including Goat Creek).**

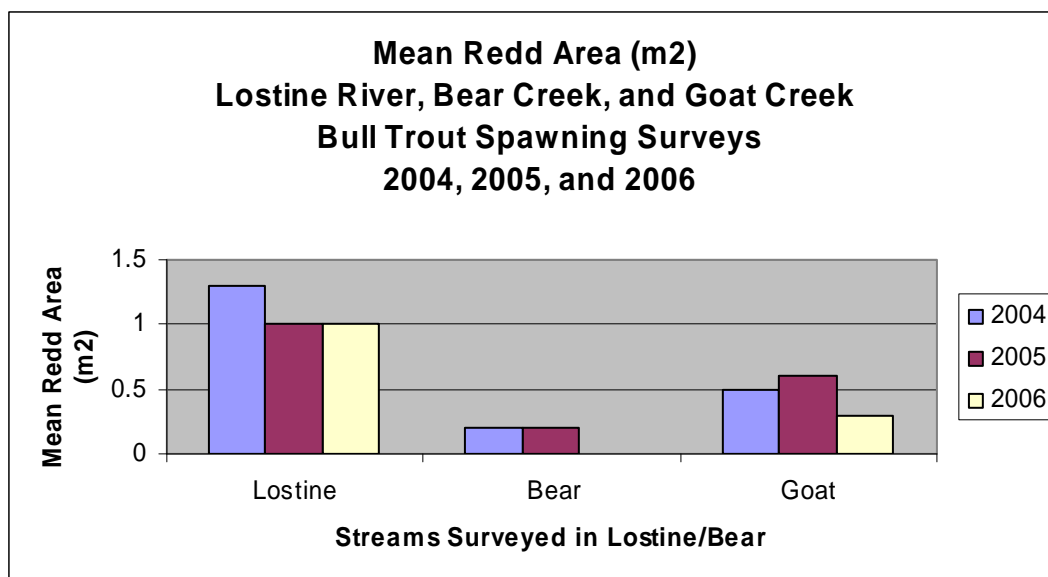


## Sizes of Bull Trout Redds

Bull trout redds were measured using the same methodology in 2004, 2005, and 2006 and comparison of bull trout redd sizes (mean redd area ( $m^2$ )) for these years is illustrated in Figures 6 and 7 below. There is a relationship between size of female salmonid and size of redd; large fish make large redds (Bjornn and Reiser 1991, and P. Sankovich, Service, pers. comm., 2006). In addition, length/frequency distributions of mature resident bull trout and mature fluvial bull trout do not overlap, therefore, there is little overlap in size of redds (P. Sankovich, pers. comm., 2006).

Figure 6 compares bull trout redd sizes for the Lostine River, Bear Creek, and Goat Creek in 2004-2006. Mean redd area ( $m^2$ ) ranged from 1-1.3 for the Lostine, 0.3-0.6 for Goat Creek, and 0.2-0.2 for Bear Creek. The Bear Creek sample area may not represent the entire Bear Creek spawning habitat (limited miles of Bear Creek were surveyed in a location near Goat Creek). Brook trout are thought to be abundant in Bear Creek (due to historical stocking in the headwater lakes). From analysis of the data illustrated in Figure 6, Bear Creek bull trout redds appeared to be resident redds and there could be overlap with brook trout, although this has not been verified. Bull trout redds were not observed or documented in Bear Creek within the index area in 2006. The Lostine River contains brook trout, but for most survey years, we have not observed brook trout spawning with bull trout, nor have we observed brook trout spawning. In the future, we will have genetics data for the Lostine, which will help determine to what magnitude the hybridization of brook trout and bull trout has occurred to date in this system. Currently, genetic sampling of bull trout/brook trout has not occurred on Bear Creek to help determine magnitude of hybridization. Goat Creek was limited in available spawning habitat. It appears from the data in 2004-2006 that the redds were a combination of resident and fluvial fish, as the redd sizes were midway between the Bear Creek (resident size) and the Lostine (fluvial size). Few bull trout were observed during the Bear and Goat Creek surveys due to it being a one time late survey in October. Two bull trout that were observed occupying a redd on Goat Creek in 2004 were <12 inches (<300 ml) and were on a redd that had an area of  $0.3 m^2$ , therefore this size of redd is resident (related to the fish size). More years of data collection on these streams should help us better understand the resident and fluvial life histories of bull trout in this area, relative to fish and redd sizes.

**Figure 6. Comparison of bull trout redd sizes [mean redd area ( $m^2$ )] for Lostine River, Bear, and Goat Creeks sampled during bull trout spawning surveys, 2004-2006.**

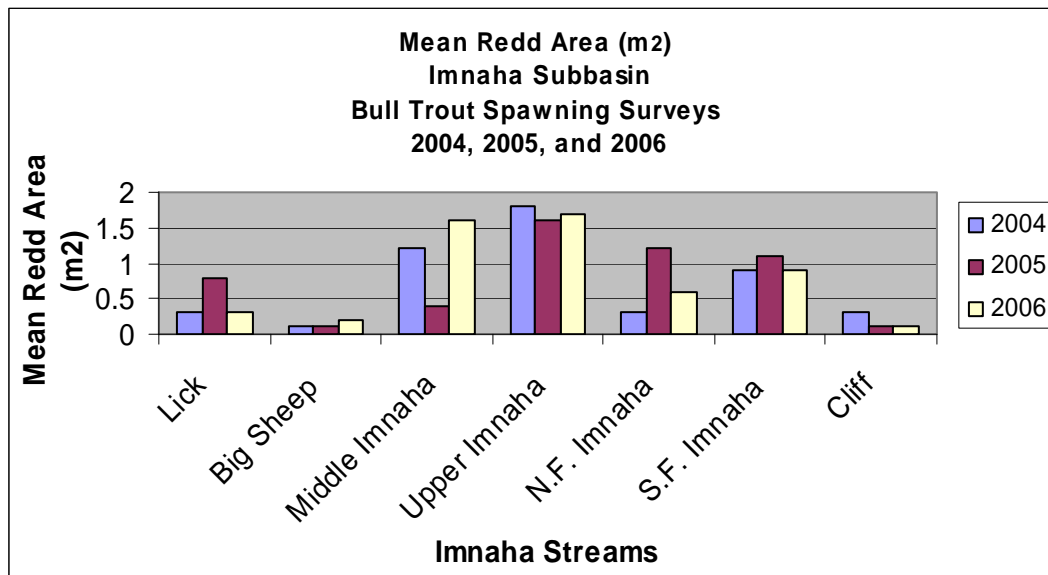


Footnote: Bull trout redds were not observed in the index area of Bear Creek in 2006.

## *Imnaha and Big Sheep*

Figure 7 compares bull trout redd sizes for the sampled streams in the Imnaha system in years 2004-2006. Mean redd area ( $\text{m}^2$ ) ranged from 0.3-0.8 for Lick Creek, 0.1-0.2 for Big Sheep, 1.6-1.8 for Upper Imnaha, 0.3-1.2 for N.F. Imnaha, 0.9-1.1 for S.F. Imnaha, and 0.1-0.3 for Cliff Creek. Middle Imnaha had only two samples in 2005. In 2006, Middle Imnaha had a large distribution of redds in this survey area (sample size = 18) compared to past years. Middle Imnaha in 2004 and 2006 had primarily fluvial size redds with resident redds documented in 2005. Cliff Creek is a known resident system with a waterfall near the mouth. The survey on Cliff Creek in 2004 included a large fluvial size redd near the confluence with the S.F. Imnaha and therefore the mean redd size was higher than in 2005 and 2006 when no fluvial redds were observed in Cliff Creek below the waterfall. Lick Creek and Imnaha had an overlap of bull trout and chinook redds, which may make differentiation between the two sometimes difficult. Lick Creek data in 2004-2006 appeared to be a combination of resident and fluvial redds (with more resident redds documented), Big Sheep was resident redds all years, and Upper Imnaha and S.F. Imnaha contained a majority of fluvial redds. North Fork Imnaha appears to have had more resident redds in 2004, more fluvial size redds in 2005, and a mix of fluvial and resident in 2006. Cliff Creek is a known resident system with a mean redd size of  $0.1 \text{ m}^2$  in 2006. Mean redd size was greater, a size of  $0.3 \text{ m}^2$  in 2004 as a result of a fluvial redd near the mouth and potential superimposition of redds above the barrier.

**Figure 7. Comparison of bull trout redd sizes [mean redd area ( $\text{m}^2$ )] for sampled streams in the Imnaha Subbasin, 2004-2006.**



Refer to Tables 4a and 4b in Appendix B for additional information on 2006 bull trout redd characteristics.

## **Bull Trout Redd Distribution on the Lostine River**

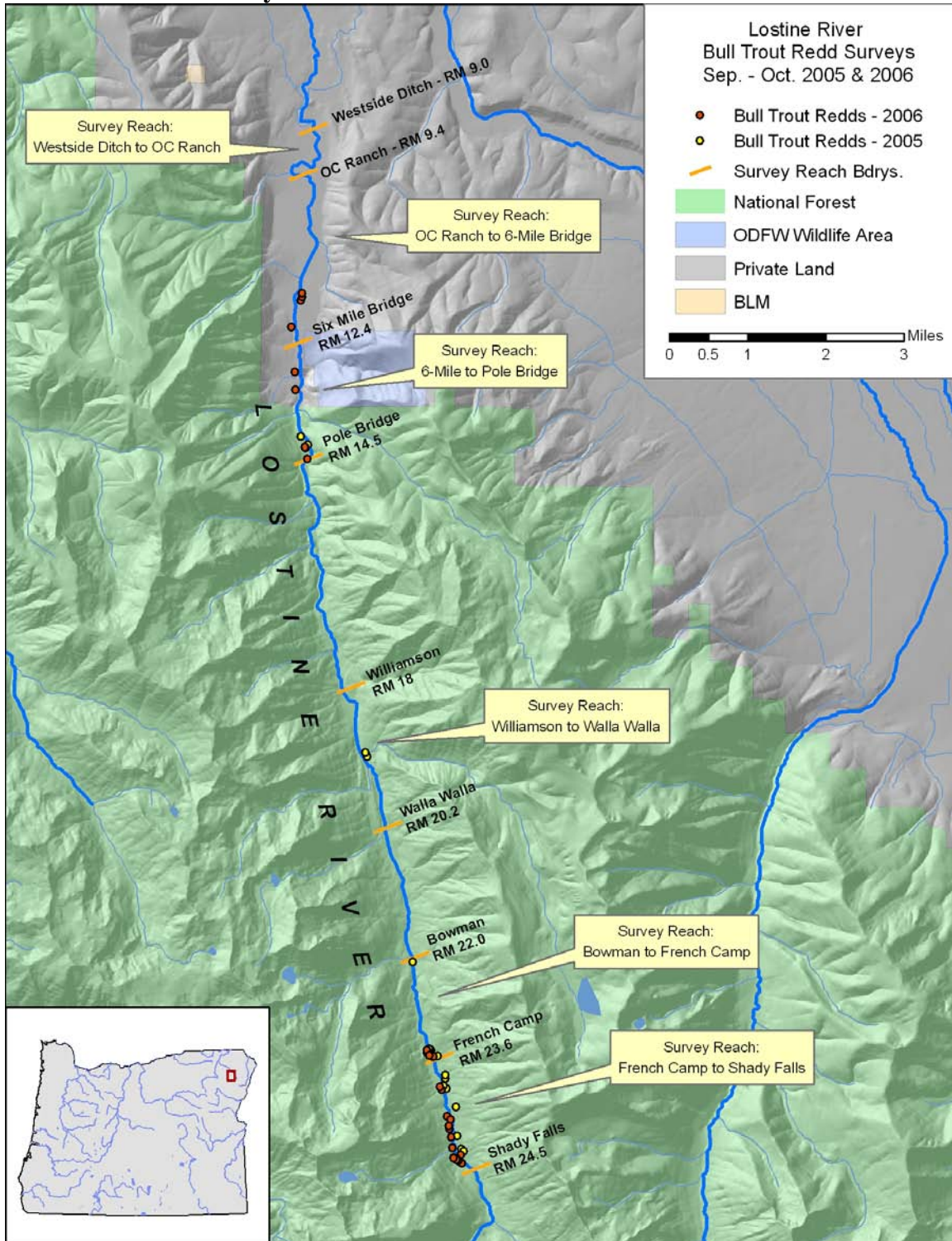
The bull trout spawning survey on the Lostine River in years 2005 and 2006 included collection of UTM coordinate data on the spatial distribution of the 2005 and 2006 bull trout redds observed along the Lostine River (Figure 8). Bull trout redds on the Lostine River (as well as in other surveyed streams) were often arranged in complexes (several redds in close proximity to each other) as shown in Figure 8. Redds were primarily located in the French Camp to Shady Falls and Bowman to French Camp reaches along the Lostine River in both 2005 and 2006; and several miles (approximately 10 miles) downstream of these reaches at the Six Mile Bridge to Pole Bridge reach. In 2006, bull trout redds were also distributed within the Six Mile Bridge to OC Ranch survey reach. The Nez Perce Tribe spring chinook acclimation facility is located within this reach which annually has the highest density of spring chinook redds, especially downstream of where the bull trout redds were documented.

Sections of the Lostine River not surveyed due to insufficient spawning gravels (boulder and cobble dominated substrate) and difficult access include; Bowman to Walla Walla (approximately 2.2 miles) and Williamson to Pole Bridge (approximately 3.5 miles). Downstream of Westside Ditch on the Lostine River (approximately 9 miles) is private property that is not surveyed due to lack of bull trout spawning gravels, higher stream temperatures, and low flows associated with irrigation withdrawal.



Downstream view of the Lostine River near Turkey Flat. Surveyors Alan Miller (USFS) and Suzanne Nostrant (NMFS) in photo, 2006.

**Figure 8. Map of the Lostine River showing bull trout redd survey reaches and bull trout redd locations in years 2005 and 2006.**



## DISCUSSION

A combination of low flows (due to drought conditions) and severe streambed scour activity in spring of 2006 created limited available habitat for spawning bull trout in the fall of 2006. This is noted by the author as most evident in the Lostine and Imnaha systems. Several side channels on the Imnaha were no longer flowing in 2006, and this was evident as well during the chinook surveys on these streams. This would likely have an effect on densities and distribution of redds for both bull trout and chinook species in these systems.

The Imnaha had a large distribution of bull trout redds that extended further downstream than in past years (Blue Hole to Indian Crossing, a two mile section); which may be due to limited passage of fluvial bull trout at the falls and potential bull trout/chinook interactions that are not well understood. As mentioned in the 2005 report, additional research on timing in the Imnaha and especially passage above and below the falls would be beneficial in our understanding of bull trout in this system.

For 2007, the Bear Creek survey should be experimental in design to include more miles upstream and be conducted twice (if feasible dependent on funding). This experimental survey in 2007 will give us a better understanding of the total bull trout spawning habitat available on this system and the timing of spawning. In addition, information on the degree of interaction of bull trout and brook trout during spawning will be noted. Future genetic sampling of bull trout and brook trout to determine degree of hybridization also is recommended for Bear Creek.

Overall, future needs for this project include continued funding and support from all involved parties for conducting and reporting bull trout redd counts in the Wallowa Mountains. We need at least 15 years (consecutive years) of bull trout redd data for trend data (Maxwell 1999) and for bull trout recovery data needs. Caution must be exercised in using the above bull trout spawning data for adult population trends until we have a complete 15 years of data.



A few of the 2006 bull trout spawning survey crew members from left to right; Ken Bronec (consultant), the author (Service), and Rick Christian (NPT). Photo by Mary Edwards.

## CONCLUSION

The local bull trout populations are relatively stable for the survey period (1999-2006); although, a minimum of 15 years is needed to determine population trends.

The Imnaha population is one of the strongholds within the Imnaha Subbasin as it has multiple age classes, contains fluvial fish, has an anadromous prey base, has connectivity with the Snake River, and bull trout are distributed throughout the habitat. Primary spawning activity on the Imnaha River has been documented to occur in the headwaters which lie within wilderness. Both fluvial and resident life history forms are present. The Imnaha River is rated at low risk of extinction, and Big Sheep is rated “of special concern” (Buchanan et al. 1997).

The Lostine River is considered a moderately-strong population within the Grande Ronde Subbasin. Our results are consistent with Buchanan et al. (1997). Lostine River and Bear Creek contain brook trout and the degree of hybridization is unknown. Limited redd count data is available on Bear Creek and this portion of the Lostine River/Bear Creek local population has been listed as a special concern by Ratliff and Howell (1992). Future genetic analysis of bull trout and brook trout is recommended to help determine the significance of this threat.



Imnaha River Bull Trout Spawning Area, 2006  
(Photo courtesy of Nez Perce Tribe)

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## APPENDIX A – PHOTOS TAKEN AT SURVEY LOCATIONS



Downstream view of the S.F. Imnaha River, 2006.

(Photo courtesy of Nez Perce Tribe).



North Fork Imnaha River, Bull Trout Spawning Survey Area.



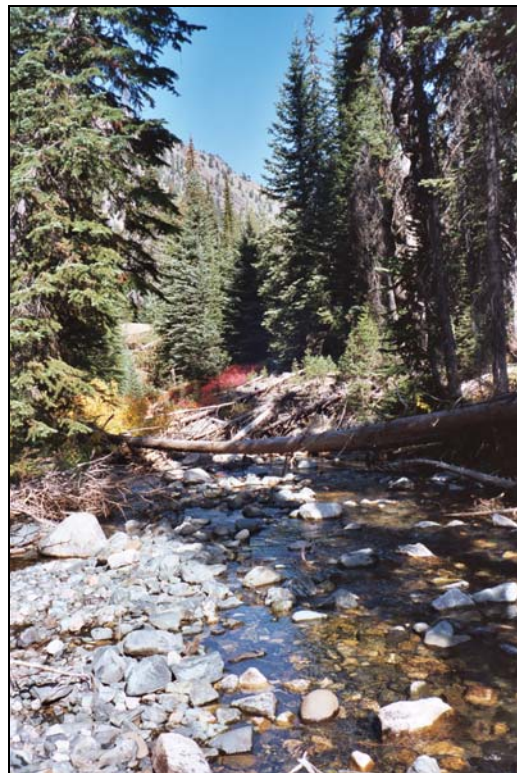
Log jam on the Imnaha River upstream of the Blue Hole, 2006. (Photo courtesy of Nez PerceTribe).



Fluvial bull trout pair on redd downstream of the Lower Imnaha Falls, Imnaha River, 2006 (Photo courtesy of the Nez Perce Tribe).



Cliff Creek waterfall, resident bull trout population above falls, 2006.  
(Photo courtesy of Nez Perce Tribe).



Cliff Creek bull trout spawning habitat



## APPENDIX B – TABLES

**Table 1 – Bull Trout Spawning Surveys and Survey Frequencies for selected Grande Ronde River and Imnaha River Streams, 1999-2006**

Stream	Year	Dates	Survey	Total	Total	Total
			Frequency	Redds	Miles	Redds/Mile
Lostine River	1999	9/16,9/23,10/12	3 Times	39	9.75	4.0
	2000	9/21,9/28,10/12	3 Times	38	13.74	2.8
	2001	9/17-18,10/11-12	Twice	43	14.4	3.0
	2002	9/23-24,10/7-8	Twice	22	10.7	2.1
	2003	9/23-24,10/6-7	Twice	71	10.5	6.8
	2004	9/14-15,10/5-6	Twice	26	8.5	3.1
	2005	9/15, 9/21-22, 10/3-10/4	Twice, and 3 Times in Turkey Flat	32	10.5	3.0
			and Shady Campground areas			
	2006	9/14, 9/20-21, 10/2-10/4	Twice, and 3 Times in Turkey Flat	45	10.5	4.3
			and Shady Campground areas			
Bear Creek	1999	9/7,9/22	Once Bear, Twice Goat	6	1.8	3.3
(including Goat Cr)	2000	10/18	Once	5	1.8	2.8
	2001	10/16	Once	12	2.3	5.2
	2002	10/15	Once	7	2.3	3.0
	2003	10/16	Once	17	3.8	4.5
	2004	10/1	Once	11	2.3	4.8
	2005	10/11	Once	16	2.8	5.7
	2006	10/10	Once	9	1.9	4.7

**Table 1 (Continued)– Bull Trout Spawning Surveys and Survey Frequencies for selected Grande Ronde River and Imnaha River Streams, 1999-2006**

<b>Stream</b>	<b>Year</b>	<b>Dates</b>	<b>Survey Frequency</b>	<b>Total Redds</b>	<b>Total Miles</b>	<b>Total Redds/Mile</b>
Imnaha River	1999	9/20,28,10/11	Middle = Thrice	14	15.2	0.9
(excluding	2000	9/20,22,25,26,27,10/11	Upper = Once, Middle = Twice	92	29.1	3.2
Big Sheep)	2001	9/20,21,10/1,2,3,9,10	Upper = Once, Middle = Twice	291	31.3	9.3
	2002	9/25,26,9/30,10/1-2,10/10-11	Upper = Once, Middle = Twice	113	30.5	3.7
	2003	9/25-26,9/29-30,10/1,10/8-9	Upper = Once, Middle = Twice	266	31.6	8.4
	2004	9/15-9/16,9-27,28,29,10/7-8	Upper = Once, Middle = Twice	293	31.5	9.3
Middle=Blue Hole	2005	9/26-28, 10/7	Once Upper and Middle	276	19.4	14.2
to Indian 2005-2006	2006	9/25-28,10/5	Upper = Once, Middle = Twice	186	19.4	9.6

**Table 1 (Continued)– Bull Trout Spawning Surveys and Survey Frequencies for selected Grande Ronde River and Imnaha River Streams, 1999-2006**

<b>Stream</b>	<b>Year</b>	<b>Dates</b>	<b>Survey Frequency</b>	<b>Total Redds</b>	<b>Total Miles</b>	<b>Total Redds/Mile</b>
Big Sheep	1999	9/21,29,30,10/18,19	Once	20	14.2	1.4
[(including Lick, and Salt).	2000	10/13-10/16	Once	12	8.4	1.4
	2001	10/14,10/17	Once	24	8.4	2.9
Salt Cr. not surveyed post 2003, and Upper Big	2002	9/30,10/1,10/14-15	Twice	41	9.3	4.4
	2003	9/22,10/14	Twice	18	9.3	1.9
	2004	9/20,9/28- 9/29,9/30,10/4,10/19	Once Big Sheep, Twice Lick	43	14.1	3.0
Sheep exploratory in 2004].	2005	9/19-20, 10/6	Twice	16	8.6	1.9
	2006	9/19, 10/4	Twice	18	7.6	2.4

**Table 2a – Bull Trout Spawning Surveys for the Lostine River Comparing 1999 – 2006 Surveys**

Stream	Years							
	1999	2000	2001	2002	2003	2004	2005	2006
Lostine River			Redds	Surveyed				
<b>Reaches</b> (miles surveyed)								
OC Ranch to Westside Ditch (0.4 miles)	0	0	0	0	0	0	0	0
Lundquist Bridge to OC Ranch (2.8)	1	0	2	3	3	5	0	5
Williamson to Walla Walla (2.2 miles)	0	2	1	0	6	1	3	0
Bowman to French Camp (1.6 miles)	18	19	16	11	18	3	9	9
French Camp to Shady Falls (1.5)	20	12.0	23	8	43	17	12	22
<b>Lostine Total Redds (Comparable Reaches)</b>	<b>39</b>	<b>33</b>	<b>42</b>	<b>22</b>	<b>70</b>	<b>26</b>	<b>24</b>	<b>36</b>
<b>Lostine Total Miles of Comparable Stream</b>	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
<b>Lostine Redds/Mile Comparable Stream</b>	<b>4.6</b>	<b>3.9</b>	<b>4.9</b>	<b>2.6</b>	<b>8.2</b>	<b>3.1</b>	<b>2.8</b>	<b>4.2</b>
<b>Total Redds For Year</b>	39	38.0	43.0	22.0	71.0	26.0	32.0	45
<b>Total Miles Surveyed For Year</b>	9.8	13.7	14.4	10.7	10.5	8.5	10.5	10.5
<b>Total Redds/Mile For Year</b>	4.0	2.8	3.0	2.1	6.8	3.1	3.0	4.3

Notes: The Lostine was surveyed three times in 1999 and 2000. Survey years 2001-2006, the Lostine was surveyed twice, (except Shady Campground and Turkey Flat areas were surveyed three times in 2005 and 2006). Dates of Lostine bull trout spawning surveys generally commenced as early as the second or third week in September and the last survey was conducted in the first or second week in October.

**Table 2b – Bull Trout Spawning Surveys for Bear and Goat Creeks Comparing 1999 – 2006 Surveys**

<b>Stream</b>	<b>Years</b>							
<b>Bear Creek</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
			<b>Redds</b>	<b>Surveyed</b>				
<b>Reaches</b> (miles surveyed)								
Bear: Goat Confluence to Wilderness Boundary (1mile)	0	2	3	1	2	3	5	0
Goat Creek: Mouth to Falls (0.9)	8	3	9	6	9	8	6	9
<b>Bear (and Goat) Total Redds (Comparable Reaches)</b>	<b>8</b>	<b>5</b>	<b>12</b>	<b>7</b>	<b>11</b>	<b>11</b>	<b>11</b>	<b>9</b>
<b>Bear Creek Total Miles of Comparable Stream</b>	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
<b>Bear Creek Redds/Mile Comparable Stream</b>	<b>4.2</b>	<b>2.6</b>	<b>6.3</b>	<b>3.7</b>	<b>5.8</b>	<b>5.8</b>	<b>5.8</b>	<b>4.7</b>
<b>Total Redds For Year</b>	8	5	12	7	17	12	16	9
<b>Total Miles Surveyed For Year</b>	1.9	1.9	2.3	2.3	3.8	2.3	2.8	1.9
<b>Total Redds/Mile For Year</b>	4.2	2.6	5.2	3.0	4.5	5.2	5.7	4.7

Notes: These surveys were conducted once, usually late in the spawning season, the first or second week in October [except in 1999, surveys were conducted in September (on 9/7 and 9/22)].

**Table 2c – Bull Trout Spawning Surveys for the Imnaha River Comparing 2001 – 2006 Surveys**

Stream	Years					
	2001	2002	2003	2004	2005	2006
	Redds	Surveyed				
<b>Reaches</b> (miles surveyed)						
<b>South Fork Imnaha and tributaries:</b>						
Cliff Creek, mouth to 2.5 miles (2.5 miles)	96	22	57	65	61	17
South Fork Imnaha, NF to Soldier (1.5 miles)	6	7	14	12	44	9
South Fork Imnaha, Soldier to Cliff (3.1 miles)	33	18	37	29	55	26
<b>North Fork Imnaha:</b>						
North Fork, above Middle Fork (4.1 miles)	49	18	40	68	39	18
North Fork, below Middle Fork to mouth (2.1 miles)	2	8	15	9	21	6
Middle Fork, mouth to falls (0.8 miles)	12	0	12	6	24	7
<b>Imnaha River:</b>						
Imnaha River, NF to Falls (0.6 miles)	0	3	5	1	2	3
Imnaha River, Falls to lower falls (0.8 miles)	41	18	35	40	13	37
Imnaha River, Blue Hole to Indian Crossing (2.0 miles)	8	7	9	3	2	18
<b>Imnaha Total Redds (Comparable Reaches)</b>	<b>247</b>	<b>101</b>	<b>224</b>	<b>233</b>	<b>261</b>	<b>141</b>
<b>Imnaha Total Miles of Comparable Stream</b>	17.5	17.5	17.5	17.5	17.5	17.5
<b>Imnaha Redds/Mile Comparable Stream</b>	<b>14.1</b>	<b>5.8</b>	<b>12.8</b>	<b>13.3</b>	<b>14.9</b>	<b>8.1</b>
<b>Total Redds For Year</b>	269	103	293	286	276	186
<b>Total Miles Surveyed For Year</b>	19.4	18.3	42.8	41.2	19.4	19.4
<b>Total Redds/Mile For Year</b>	13.9	5.6	6.8	6.9	14.2	9.6

Notes:

All reaches except Blue Hole to Indian were surveyed once in 2001 to 2006.

The Blue Hole to Indian Crossing reach was surveyed twice, in mid September and October from 2001 to 2004 and 2006 and surveyed once in 2005.

**Table 2d – Bull Trout Spawning Surveys for Big Sheep and Lick Creek  
Comparing 2000 – 2006 Surveys**

<b>Stream</b>	<b>Years</b>						
<b>Big Sheep Creek (including Lick Creek)</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>
		<b>Redds</b>	<b>Surveyed</b>				
<b>Reaches</b> (miles surveyed)							
Big Sheep, canal to 39 rd. (1.9 miles)	2	6	17	2	3	5	6
Lick Creek, Meadow to 39 rd. (1.5 miles)	0	6	3	0	1	3	5
Lick Creek, 39 rd. to Quartz Creek (4.2 miles)	8	5	14	8	4	1	7
<b>Big Sheep Total Redds (Comparable Reaches)</b>	<b>10</b>	<b>17</b>	<b>34</b>	<b>10</b>	<b>8</b>	<b>9</b>	<b>18</b>
<b>Big Sheep Creek Total Miles of Comparable Stream</b>	7.6	7.6	7.6	7.6	7.6	7.6	7.6
<b>Big Sheep Creek Redds/Mile Comparable Stream</b>	<b>1.3</b>	<b>2.2</b>	<b>4.5</b>	<b>1.3</b>	<b>1.1</b>	<b>1.2</b>	<b>2.4</b>
<b>Total Redds For Year</b>	12	24	41	18	43	16	18
<b>Total Miles Surveyed For Year</b>	8.4	8.4	9.3	9.3	14.1	8.6	7.6
<b>Total Redds/Mile For Year</b>	1.4	2.9	4.4	1.9	3.0	1.9	2.4

Notes: Survey frequency varied by year, surveys were conducted once in mid to late October in years 2000 and 2001 for both Big Sheep and Lick Creek, and surveys were conducted twice in years 2002-2006, except for Big Sheep which was surveyed only once in 2004.

**Table 3a – Bull Trout Spawning Surveys for the Imnaha River, 2006**

<b>Imnaha Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
<b>Stream Reach, Section</b>													
<b>Upper Imnaha System</b>													
<b>South Fork Tributaries</b>													
Cliff Cr., mouth to 2.5 miles	Sep 26	4.0	2.5	2.0	15.0	17.0	4.3	6.8	4.0	2.0	2.0	0.0	0.0
<b>South Fork Tributaries Total</b>		<b>4.0</b>	<b>2.5</b>	<b>2.0</b>	<b>15.0</b>	<b>17.0</b>	<b>4.3</b>	<b>6.8</b>	<b>4.0</b>	<b>2.0</b>	<b>2.0</b>	<b>0.0</b>	<b>0.0</b>
<b>North Fork</b>													
Middle Fork, mouth to falls	Sep 26	1.3	0.8	1.0	6.0	7.0	5.4	8.7	4.0	2.0	0.0	2.0	0.0
N.F. above M.F. (reach 3-7)	Sep 25	6.6	4.1	3.0	15.0	18.0	2.7	4.4	6.0	3.0	2.0	0.0	1.0
N.F. below M.F. (reach 1-2)	Sep 26	3.4	2.1	1.0	5.0	6.0	1.8	2.8	1.0	0.0	0.0	0.0	1.0
<b>North Fork Total</b>		<b>11.3</b>	<b>7.0</b>	<b>5.0</b>	<b>26.0</b>	<b>31.0</b>	<b>2.7</b>	<b>4.4</b>	<b>11.0</b>	<b>5.0</b>	<b>2.0</b>	<b>2.0</b>	<b>2.0</b>
<b>South Fork</b>													
S.F., N.F. to Soldier	Sep 25	2.4	1.5	0.0	9.0	9.0	3.8	6.0	3.0	0.0	2.0	1.0	0.0

<b>Imnaha Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
S.F., Soldier to Cliff	Sep 26-27	5.0	3.1	0.0	26.0	26.0	5.2	8.4	1.0	1.0	0.0	0.0	0.0
<b>South Fork Total</b>		<b>7.4</b>	<b>4.6</b>	<b>0.0</b>	<b>35.0</b>	<b>35.0</b>	<b>4.7</b>	<b>7.6</b>	<b>4.0</b>	<b>1.0</b>	<b>2.0</b>	<b>1.0</b>	<b>0.0</b>
<b>Upper Imnaha</b>													
Upper Imnaha (Falls to North Fork)	Sep 27	1.0	0.6	1.0	2.0	3.0	3.0	4.8	1.0	0.0	0.0	0.0	1.0
Upper Imnaha Falls to lower falls	Sep 27	1.3	0.8	5.0	32.0	37.0	28.5	45.8	9.0	0.0	0.0	1.0	8.0
Falls downstream .67 mi. to beg. of gorge	Sep 28	1.1	0.7	5.0	32.0	37.0	33.6	54.1	5.0	0.0	0.0	0.0	5.0
Lower end of gorge to next gorge (.25 miles)	Sep 27	0.4	0.2	1.0	6.0	7.0	17.5	28.2	4.0	0.0	0.0	1.0	3.0
Canyon above slide to canyon just above slide	Sep 27	1.5	0.9	0.0	1.0	1.0	0.7	1.1	0.0	0.0	0.0	0.0	0.0
<b>Upper Imnaha Total</b>		<b>5.3</b>	<b>3.3</b>	<b>12.0</b>	<b>73.0</b>	<b>85.0</b>	<b>16.0</b>	<b>25.8</b>	<b>19.0</b>	<b>0.0</b>	<b>0.0</b>	<b>2.0</b>	<b>17.0</b>
<b>Upper Imnaha System Total</b>		<b>28.0</b>	<b>17.4</b>	<b>19.0</b>	<b>149.0</b>	<b>168.0</b>	<b>6.0</b>	<b>9.7</b>	<b>38.0</b>	<b>8.0</b>	<b>6.0</b>	<b>5.0</b>	<b>19.0</b>

<b>Imnaha Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
<b>Middle Imnaha</b>													
Blue Hole to Indian Crossing	Sep 28	3.2	2.0	2.0	15.0	17.0	5.3	8.5	35.0	0.0	0.0	3.0	32.0
Blue Hole to Indian Crossing	Oct 5	3.2	2.0	0.0	1.0	1.0	0.3	0.5	6.0	0.0	0.0	1.0	5.0
<b>Middle Imnaha Total</b>		<b>3.2</b>	<b>2.0</b>	<b>2.0</b>	<b>16.0</b>	<b>18.0</b>	<b>5.6</b>	<b>9.0</b>	<b>41.0</b>	<b>0.0</b>	<b>0.0</b>	<b>4.0</b>	<b>37.0</b>
<b>Big Sheep System</b>													
Big Sheep, Canal to Rd. 39	Sep 19	3.1	1.9	0.0	2.0	2.0	0.6	1.0	0.0	0.0	0.0	0.0	0.0
Big Sheep, Canal to Rd. 39	Oct 4	3.1	1.9	0.0	4.0	4.0	1.3	2.1	5.0	3.0	2.0	0.0	0.0
Lick Cr. Meadow to 39 rd.	Sep 19	2.4	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lick Cr. Meadow to 39 rd.	Oct 4	2.4	1.5	0.0	5.0	5.0	2.1	3.4	2.0	2.0	0.0	0.0	0.0
Lick Cr. 39 Rd. to Quartz Cr.	Sep 19	6.8	4.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

<b>Imnaha Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
Lick Cr. 39 Rd. to Quartz Cr.	Oct 4	6.8	4.2	0.0	7.0	7.0	1.0	1.7	5.0	5.0	0.0	0.0	0.0
<b>Big Sheep System Total</b>		<b>12.3</b>	<b>7.6</b>	<b>0.0</b>	<b>18.0</b>	<b>18.0</b>	<b>1.5</b>	<b>2.4</b>	<b>12.0</b>	<b>10.0</b>	<b>2.0</b>	<b>0.0</b>	<b>0.0</b>
<b>Imnaha Basin Total</b>		<b>43.5</b>	<b>27.0</b>	<b>21.0</b>	<b>183.0</b>	<b>204.0</b>	<b>4.7</b>	<b>7.5</b>	<b>91.0</b>	<b>18.0</b>	<b>8.0</b>	<b>9.0</b>	<b>56.0</b>

**Table 3b – Bull Trout Spawning Surveys for some tributary streams within the Grande Ronde Basin  
Lostine River and Bear Creek, 2006**

<b>Grande Ronde Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
<b>Stream Reach, Section</b>													
<b>Bear Creek</b>													
Goat Cr (Mouth to Falls)	Oct 10	1.4	0.9	0.0	9.0	9.0	6.4	10.0	0.0	0.0	0.0	0.0	0.0
Bear Creek (wilderness boundary to Goat Creek)	Oct 10	1.6	1.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.0	0.0	0.0
<b>Bear Creek Totals</b>		<b>3.0</b>	<b>1.9</b>	<b>0.0</b>	<b>9.0</b>	<b>9.0</b>	<b>3.0</b>	<b>4.7</b>	<b>1.0</b>	<b>1.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

<b>Grande Ronde Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
<b>Stream Reach, Section</b>													
<b>Lostine River</b>													
OC Ranch to Westside Ditch	Sept 21	0.6	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
OC Ranch to Westside Ditch	Oct 2	0.6	0.4	0.0	0.0	0.0	0.0	0.0	12.0	0.0	0.0	2.0	10.0
Lundquist Bridge to OC Ranch	Sep 20-21	4.4	2.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lundquist Bridge to OC Ranch	Oct 2-3	4.4	2.8	0.0	5.0	5.0	1.1	1.8	21.0	0.0	0.0	0.0	21.0
Pole Bridge to 6 Mile Bridge	Sep 20	3.2	2.0	1.0	7.0	8.0	2.5	4.0	1.0	0.0	0.0	0.0	1.0
Pole Bridge to 6 Mile Bridge	Oct 3	3.2	2.0	0.0	1.0	1.0	0.3	0.5	1.0	0.0	0.0	0.0	1.0
Williamson to Walla Walla	Sep 21	3.5	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Williamson to Walla Walla	Oct 2	3.5	2.2	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0
Turkey Flat	Sep 14			1.0	5.0	6.0			2.0	0.0	2.0	0.0	0.0
Bowman to French Camp	Sep 20	2.6	1.6	0.0	1.0	1.0	0.4	0.6	2.0	0.0	2.0	0.0	0.0
Bowman to French Camp	Oct 3	2.6	1.6	0.0	2.0	2.0	0.8	1.3	3.0	1.0	1.0	1.0	0.0
Shady Campground	Sep 14			0.0	0.0	0.0			9.0	1.0	1.0	6.0	1.0
French Camp to Shady Falls	Sep 20	2.4	1.5	3.0	3.0	6.0	2.5	4.0	17.0	0.0	3.0	9.0	5.0

<b>Grande Ronde Basin</b>	<b>Dates</b>	<b>Kilometers Surveyed</b>	<b>Miles Surveyed</b>	<b>Redds Occupied</b>	<b>Redds Unoccupied</b>	<b>Redds Total</b>	<b>Redds Per km</b>	<b>Redds Per Mile</b>	<b>Total Bull Trout (But)Observed</b>	<b>But &lt;6 “</b>	<b>But &lt;12” (~300mm)</b>	<b>But &lt;18” (450 mm)</b>	<b>But &gt;18 (450 mm)</b>
French Camp to Shady Falls	Oct 3	2.4	1.5	0.0	16.0	16.0	6.6	10.7	13.0	5.0	8.0	0.0	0.0
<b>Lostine River Totals</b>		<b>16.8</b>	<b>10.5</b>	<b>5.0</b>	<b>40.0</b>	<b>45.0</b>	<b>2.7</b>	<b>4.3</b>	<b>82.0</b>	<b>7.0</b>	<b>18.0</b>	<b>18.0</b>	<b>39.0</b>

**Table 4a – Summary Bull Trout Redd Survey, Grande Ronde River Basin, Lostine River, Bear Creek, and Goat Creek, 2006**

Stream	n*1		Length (M)	Width (M)	Area (m2)	Length/Width ratio
Lostine	45	mean	1.2	0.7	1.0	1.7
		sd	0.4	0.3	0.7	0.5
		max	2.3	1.5	3.0	3.1
		min	0.3	0.2	0.1	1.1
Goat Creek	9	mean	0.7	0.4	0.3	1.7
		sd	0.2	0.2	0.1	0.7
		max	1.0	0.8	0.6	3.3
		min	0.4	0.3	0.1	0.9

Footnote 1: n = number of redds observed and measured (sample size).

Footnote 2: Bear Creek had no redds observed in the survey area in 2006.

**Table 4b – Summary Bull Trout Redd Survey, Imnaha River Basin, 2006**

Stream	n*1		Length (M)	Width (M)	Area (m2)	Length/Width ratio
Lick Creek	12	mean sd max min	0.7 0.3 1.1 0.4	0.4 0.1 0.6 0.2	0.3 0.2 0.6 0.1	1.8 0.6 2.5 1.0
Big Sheep Creek	6	mean sd max min	0.6 0.3 1.1 0.3	0.4 0.2 0.6 0.1	0.2 0.2 0.6 0.0	1.8 0.6 2.5 1.0
Middle Imnaha	18	mean sd max min	1.6 0.5 2.4 0.7	0.9 0.2 1.5 0.4	1.6 0.7 3.3 0.3	1.8 0.3 2.4 1.4
Upper Imnaha	85	mean sd max min	1.7 0.5 2.9 0.6	0.9 0.3 1.9 0.4	1.7 0.8 3.8 0.2	1.8 0.5 3.3 1.0
N.F. Imnaha	25	mean sd max min	1.0 0.7 3.2 0.2	0.4 0.2 0.9 0.1	0.6 0.7 2.9 0.0	2.2 0.7 3.7 1.2
S.F. Imnaha	35	mean sd max min	1.1 0.4 2.2 0.6	0.7 0.2 1.5 0.4	0.9 0.6 3.3 0.2	1.6 0.3 2.8 1.1
Cliff Creek	17	mean sd max	0.4 0.1 0.6	0.2 0.1 0.3	0.1 0.0 0.2	2.2 0.5 3.3

		min	0.2	0.1	0.0	1.4
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Footnote 1: n = number of redds observed and measured (sample size).